Simple Circular Motion: A Case Study Comparing Cartesian Geometry and Quirk Theory Solutions

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The motion of a small test mass around a much heavier body can be simulated for a limited solution of the two body problem by the equation for circular motion in a Cartesian plane. It is assumed for this particular case that no relativistic conditions exist. Here subscripted numbers are used to differentiate axis.

Assuming the larger body lies at the origin of the co-ordinates, the Cartesian solution for circular motion of such a system is:

$$x_0(t) = a \cdot \sin(w \cdot t)$$
$$x_1(t) = a \cdot \cos(w \cdot t)$$

$$x_2(t) = 0$$

To simulate this in Quirk Space there are only two point masses, so we need only one quirk, one point being at the centre of mass of the large body, and one being at the smaller.

In Quirk theory, we know there are no solutions in the M=1 L Manifold, limited solutions in M=2, quite diverse solutions in M=3, and Nature probably expresses itself in M=4. In this particular case there is a perfectly good solution in M=3, and M=4 is not required. It will be shown below why M=4 is almost certainly required for relativistic conditions.

So the system outlined above requires only one quirk, with one point fixed at the M=3 coordinate origin and (0+0i,0+0i,0+0i), and the other point whose real components follow the equations above. The quirk co-ordinate differences may now be calculated as:

$$\Delta x_0(t) = a \cdot \sin(w \cdot t)$$

$$\Delta x_1(t) = a \cdot \cos(w \cdot t)$$

$$\Delta x_2(t) = 0$$

It follows from paper on Quirk theory that ENS Equation 6 for one quirk for M=3 is:

$$\Delta x_0(t)^2 - \Delta y_0(t)^2 + \Delta x_1(t)^2 - \Delta y_1(t)^2 + \Delta x_2(t)^2 - \Delta y_2(t)^2$$

$$+2 \cdot i \cdot (\Delta x_0(t) \cdot \Delta y_0(t) + \Delta x_1(t) \cdot \Delta y_1(t) + \Delta x_2(t) \cdot \Delta y_2(t)) = 0$$

Which is trivially solved by assigning the three unknown coordinates in Quirk space.

$$\Delta y_0(t) = 0$$

$$\Delta y_1(t) = 0$$

$$\Delta y_2(t) = a$$

And to verify this by term by term substitution;

$$(a \cdot \sin(w \cdot t))^2 - 0 + (a \cdot \cos(w \cdot t))^2 - 0 + 0 - a^2 +$$

$$i \cdot (a \cdot \sin(w \cdot t) \cdot 0 + \mathrm{a} \cdot \cos(w \cdot t) \cdot 0 + a \cdot 0$$

$$= 0 + 0i$$

Noting that the solution is valid for all (a,w), and because this equation equals 0 at all times (t), it follows that both the first and second differentials with time (Equations 7 and 8) are also equal to 0. Since all three equations 6,7,8 equal zero, it is valid Quirk Space state solution.

And so, it has been proved that a circle is a circle. It is not just any circle though. It is also a dynamic trajectory which is a function of time, which we know from Cartesian geometry it already has encoded in it the Kepler dynamics. Therefore this solution also has those dynamics encoded; but now in the geometry itself and not as an explicit parameterisation. Also the dynamics required for this motion are already encoded in the geometry, because equations 7,8 automatically apply to any solution to the ENS.

That is a pretty big difference in the two solutions for the same thing. This result indicates the very special properties of the ENS:

a) The parameters (a,w) are explicit in Cartesian geometry, but is encoded in the very shape of the geometry in Quirk space. The very shape of the space encodes the circular motion. This cannot be done in Cartesian geometry.
b) The ENS is equal to zero, which means the motion state (in this case circular motion) encoded in the geometry itself contains information about the dynamics flowing from that current shape. This is because setting the ENS to zero automatically guarantees Equations 7 and 8 hold. The current shape of the geometry defines the dynamics of moving to other states.

It may well be claimed now that it is not permitted to use the imaginary coordinates in quirk space to attain this solution. This may be rebutted on several points.

1) It has never been claimed that the ENS is a generally applicable tool to all of mathematics, quite the opposite. The ENS is supposed to only enact the principles of Quantum Mechanics and Relativity we observe in our Universe, and the M=4 space must be used to do this to give the degrees of freedom in which to act. The system it is modelling must be one that is realisable even if in approximate form in Nature. It is actually best suited by design for systems that have some principle of least action in their observed operation.
2) There are plenty of physics theories (including general relativity) where an extra dimension in geometry cannot be physically observed. The quirk is allowed to move inside the M=4 manifold, and it is perfectly valid to allow that quirk to follow whatever trajectory it needs to make that solution available in the three dimensions we can observe. There can be no proof that the quirk is not moving in this way in dimensions we cannot observe. Indeed in this particular case the quirk only moves in these other dimensions when the size of the orbit expands.
3) The task was to obtain a simple solution to a real planar problem in Cartesian geometry (in this case motion of a small mass around a larger one in Quirk space. The solution has been achieved as the task required. It has been stated in the paper that L geometry is not Cartesian geometry, and that there is no exact mathematical transform between the two. There cannot be, they are

two completely different classes of geometry, even though they share common terminology like points and co-ordinates.

To anticipate the discussion for solutions in systems where relativistic effects occur, the following brief note is appended, since it also explains exactly why these other dimensions cannot be observed by us.

The Requirement for the M=4 L Manifold for Quirk Theory: The Photon Solution

A brief note is required for the reasoning that M=4 is required to model our universe in an L manifold.

The 4C space is, of course, not the space-time geometry used in general relativity, however the way the ENS works within The M=4 L manifold allows relativistic effects to be expressed as valid solutions in the manifold as follows:

If we take the ENS equation for M=4, and set the first 3 imaginary co-ordinates to zero, and set the fourth real coordinate to 0, we end up with the ENS only having to satisfy:

$$\Delta x_0(t)^2 + \Delta x_1(t)^2 + \Delta x_2(t)^2 - \Delta y_3(t)^2 + 0 \cdot i = 0$$

And that if we then define $\Delta y_3(t) = c \cdot \Delta t$, as we can do, because it is after all, a function of t only, we get the familiar equation

$\Delta x_0(t)^2 + \Delta x_1(t)^2 + \Delta x_2(t)^2 - c^2 \cdot (\Delta t)^2 + 0 \cdot i$=0

This equation is the space-time interval of the photon, and is also indicative that Lorentz invariant solutions might well be available by this mechanism in the L Manifold of Quirk Space.

It also directly shows that the photon analogue in Quirk space can only have three degrees of freedom in only three of the dimensions, and also needs a fourth dimension where its motion is not at all free but constrained and correlated by the action of the ENS.

It follows then that any matter constructed out of charged particles cannot see these extra dimensions using the electromagnetic spectrum, and that matter itself is also limited to the same three degrees of motion as the photon.

The ENS has 8 such photon solution in the M=4 space taking combinations of 3+1 dimensions, where each group of three is all real, or all imaginary, and the fourth is the opposite type.

It follows that charged matter can be constructed in any of these 8 spaces equally, but any such matter built in one space is incapable of viewing the other seven in the electromagnetic spectrum. And yet the whole 8 solutions remain connected and integrated into the 4C space, for other forces like gravity to act upon all matter regardless of what dimensions the electromagnetic force restricts it to.

Further, by symmetry, the matter we cannot see should be made up of the same standard model particles present in the visible matter part of space. Given the grouping of 4 solutions with RRRI dimensions, and four with IIIR dimensions, it follows with just a little speculation that four of invisible seven solutions might contain only antimatter, and that this cannot annihilate because the electromagnetic coupling between the 8 spaces is broken.

The question now to be asked is do the gauge symmetries of the ENS group break down to all eight fields or only a subset of these. This point is now addressed using group theory.

Given that the primary known gauge symmetries in the +/-1 symmetry of the group associated with Equation 6 of the theory is 12222237, this implies one gravity field, and five electromagnetic fields, and the 37 forces presumably tied up with expressing the other forces.

On this basis a firm prediction can now be made:

On the basis of 73% Dark Energy, the remaining 27% of matter should be 21.6% Dark matter, and 5.4% ordinary matter we can observe, and that the dark matter should be made up of standard particle model particles.

First and Second Time Derivates of the Photon Solution

Since Equation 6 ENS has a valid solution for the photon, and only one quirk is required to represent this solution, it follows that a quirk represents a single photon, and the single quanta of momentum and energy should be expressed by Equations 7, 8 for this photon solution to 6.

Because the quirk is a discrete entity, it also follows that the pair of points at each end of the quirk represent a single quanta of mass, a result that is actually implicitly required by Quantum Mechanics, but often overlooked. To calculate mass in Quirk pace, the total point count in the quirks (2*number of quirks=2*Nq) associated with that system must be added up. The relationship between the actual number of number of quirks and the number of points in Quirk space is fixed by definition as Nq=(N-1)*N/2 since every pair-wise combination of points has a quirk associated with it.

It should perhaps be explained why QM implicitly quantises mass. Schrödinger's equation of course does not quantise mass, but when you come to apply it to create the wave functions of known particles, the mass must be given a specific value (electron mass and so on). It turns out, no other mass will do, or the equations do not work. You cannot just adjust the rest mass of the electron and keep the equations working.

So it is the QM requirement of a unique mass for each wave function that quantises mass. When you add up the mass of a real sample of matter it is always a count of the number of wave functions multiplied by the unchanging rest mass of each. Mass therefore has cardinality of the natural numbers in any empirical calculation of mass.

Because General Relativity deals only with a continuum of mass values in space, the two theories are fundamentally incompatible, and will not be compatible until mass in the GR theory is quantised. At this point the stress energy tensor of the GR field equations should be explicitly related to the QM wave function.

The Mathematical Group Associated with the ENS

Because the previous section directly states that energy and momentum is transferred along the current aligned axis of a single quirk, and because as shown in the paper, the points in the quirks can only escape each other along the root vectors of the mathematical group associated with the ENS, it follows that not only should this group have within it all the gauge symmetries required to express the known force gauge couplings, but the relative vectors between the roots making up each group (give or take some relativistic corrections) should directly relate to the relative angles at which decay particles escape from a single nuclear disintegration.

It should be therefore possible to do a direct confirmation of this theory from the known angles of decay particles in nuclear disintegrations.

It is not known if the group associated with the ENS has already been discovered. If not, and if in the fullness of time, the ENS is shown to be an important unifying principle, it is proposed that it be called GENSIS (The Group that ENS IS.)

Chronology of Quantum Events

It also should be noted that any two particles made up of points have quirks acting within them to hold them together, and between them to mediate force. The mechanism by which force is mediated is for a quirk to exchange or swap its points from one particle to the other. No net change in point count in the particles is observed, but an exchange of momentum and energy occurs as per Equations 7 and 8.

This swapping of points according to the photon solution presented above, implies the exchange of state information in quantum events is explicitly ordered in space-time, and occurs in a pair-wise fashion.

This is an entirely consistent and explanatory mechanism for the recent paper "Constraint on Chronologies" by Shapere, Wilczik. http://arxiv.org/abs/1208.3841